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10/560,173	10/06/2006	Hiroyuki Ochiai	283229US2X PCT	1447

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EXAMINER	
HORNING, JOEL G	

ART UNIT	PAPER NUMBER
1712	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/560,173	OCHIAI ET AL.	
	Examiner	Art Unit	
	JOEL HORNING	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 August 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *52-74 and 77-80* is/are pending in the application.

4a) Of the above claim(s) *52-55,59-71 and 74* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *56-58,72,73 and 77-80* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08-24-2011*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. **Claims 52-55, 59-71 and 74-76** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions/species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 07-13-2009.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. **Claims 78 and 80** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In particular, the examiner can find no support for the limitation "wherein a peak current is not greater than several tens of amperes." Please show where you have support for this limitation or remove it.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 56-58** are rejected under 35 U.S.C. 103(a) as being unpatentable over Schell et al (US 5952110) in view of Koizumi et al (EP1035231, as supplied by applicant).

The instant **claim 56** is directed towards a method for producing a surface treated component of a turbine engine, comprising:

a. Applying a compressed powder of a mixture including one or more oxidation-resistant metals and one or more ceramic materials as a tool electrode, and
b. Forming a protective coating on a portion of an untreated component by processing the portion as a workpiece of an electric spark machine with the tool electrode spaced from the component in an electrically insulating fluid.

Schell et al is directed towards a method for forming a protective (and abrasive/wear resistant) coating on a gas turbine engine component (abstract). The method comprises depositing a layer of an oxidation resistant metal alloy, then depositing a composite layer of (1) an oxidation resistant metal, such as a NiCr (e.g. NiCrCoAl) alloy **12** and (2) abrasive particles (col 5, line 34-46). The abrasive particles **16** in the composite layer can be ceramics, such as alumina (col 5, lines 25-34) and Schell et al teaches the use of other abrasives material, such as cubic boron nitride, as common, with materials that last through the green run of the engine as preferred (col 1, line 61 through col 2, line 4). Schell et al does not teach depositing this composite layer by an electric spark machine process.

However, Koizumi et al is also directed towards a process for depositing wear resistant coatings. It teaches that electrospark alloying (ESA) methods are known to be suitable for the deposition of such coatings. This method works by creating a spark between the substrate and a tool electrode formed of the material to be deposited, so that material from the electrode transfers to the substrate and forms a coating [0002]. The space between the electrode and the substrate can be an electrically insulating fluid, such as argon (a fluid can be either a gas or a liquid) [0046] or a liquid (which it is readily apparent would also need to be relatively insulating otherwise a spark could not form, because the electricity would just conduct through the liquid instead) [0029-0030].

Koizumi et al further teaches forming an electrode by mixing powders of the materials to be deposited. This should include at least one metal from a list which includes: Ni, Co, Cr and Al. The powder mixture is compressed and treated in order to form an axial body, which is the tool electrode [0010]. In addition to the metal powder, abrasive powders, such as cubic BN, is added to the powder mixture in order to increase its wear resistance [0023].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the NiCr alloy/Alumina composite coating of Schell et al by an ESA process as taught by Koizumi et al by: mixing NiCr Alloy powder with alumina powder and forming it into a tool electrode, and generating a spark between the electrode and the substrate so that the substrate is coated. Such a person would have been motivated to do so, since it was a known deposition method to be

suitable for the formation of such protective coatings and would produce predictable results **(claims 56 and 57).**

Regarding **claim 58**, Schell et al further teaches depositing an additional ceramic layer **14** over the composite metal/ceramic layer (which can be considered to comprise a protective metal coating portion **12** and a second ZrO_2-Y portion **16**, see figure 1) by a PVD process (col 5, lines 37-48), which further protects the substrate.

4. **Claims 72-73** are rejected under 35 U.S.C. 103(a) as being unpatentable over Schell et al (US 5952110) in view of Koizumi et al (EP 1035231) in view of Kamo et al (US 4738227) in view of Church et al (US 3956531) .

These claims are directed towards a process for producing a surface treated portion of a turbine engine, comprising:

a. Forming a base coating on a portion of an untreated component by processing the portion as a workpiece of an electric spark machine with a tool electrode of an oxidation resistant metal;
b. Forming a protective coating coated on the base coating and the intermediate substance by processing the base coating and the intermediate substance as a workpiece of an electric spark machine with a tool electrode of one or more protective materials selected from the group consisting of oxide ceramics, cubic BN and oxidation-resistant metals; and

c. Closing pores of the protective coating by filling a powder of SiO_o or $MoSi_2$ into the pores and heating the portions enough to change the powder into amorphous SiO_2.

Schell et al is directed towards a method for forming a protective (and abrasive/wear resistant) coating on a gas turbine engine component (abstract). The process forms the structure shown in figure 1, and comprises:

a. depositing a first layer of an oxidation-resistant NiCr metal alloy (e.g. NiCrCoAl) alloy (**claim 73**, col 5, lines 34-37), then
b. depositing a second protective layer comprising a NiCr alloy and an intermediate (abrasive) particle substance **16**, which has 40-70% of the particles size extending out of the NiCr alloy material (col 5, lines 36-41). Schell et al teaches a variety of abrasives as known to the art, like cubic boron nitride and alumina (col 1, lines 58-63). A ceramic material **14** is then deposited between the abrasive particles as part of this protective layer by plasma spraying (col 5, line 34-46). The ceramic is preferably made of a zirconia (col 4, lines 66-67) and it improves the durability and thermal stability of the underlying engine component (col 5, lines 6-12).

Schell et al does not teach depositing this first or second composite layer by an electric spark machine process. It also does not teach filling the pores in the zirconia coating with a SiO_2 powder and heating it to form amorphous SiO_2.

However, Koizumi et al is also directed towards a process for depositing wear resistant coatings. It teaches that electrospark alloying (ESA) methods are known to

be suitable for the deposition of such coatings. This method works by creating a spark between the substrate and a tool electrode formed of the material to be deposited, so that material from the electrode transfers to the substrate and forms a coating [0002]. This is done with a gas between to the substrate and the electrode (intermediate material) [0025].

Koizumi et al further teaches forming an electrode by mixing powders of the materials to be deposited. This should include at least one metal from a list which includes: Ni, Co, Cr and Al. The powder mixture is compressed and treated in order to form an axial body, which is the tool electrode [0010]. In addition to the metal powder, abrasive powders, such as cubic BN, is added to the powder mixture in order to increase its wear resistance [0023].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the first NiCr alloy coating of Schell et al by an ESA process as taught by Koizumi et al and then to deposit the first part of the second protective layer by mixing NiCr Alloy powder with alumina (metal oxide) or cubic BN powder and forming it into a tool electrode, and generating a spark between the electrode and the substrate so that the substrate is coated. The zirconia of the second protective layer could then be deposited by plasma spray. Such a person would have been motivated to deposit these metal containing layers by the ESA process since it was a deposition method known to be suitable for the formation of such protective and abrasive coatings which would produce predictable results.

Kamo et al is directed towards combustion engines (abstract) and contains teaching highly relevant to the insulating zirconia coatings on such components. Like Schell et al it teaches plasma spraying zirconia coatings on its engine components as a thermal barrier (col 5, lines 40-45). Kamo et al additionally teaches that, in order to further increase the durability of the zirconia, coating the zirconia layer with a ceramic coating material comprising silica which is impregnated into the pores of the plasma sprayed zirconia with a liquid chromium precursor and then thermally treated to 1000°F so that it closes the pores in the zirconia (col 5, lines 45-63). Since it does not say that the resulting silica is crystalline, so a person of ordinary skill in the art would expect that amorphous silica (glass) would be used. Furthermore after the heat treatment the resulting silica would be glassy (amorphous). Kamo et al incorporates the Church et al reference (US 3956531) in order to teach how the silica containing coating is used (col 5, lines 64-66), but Kamo et al itself does not specifically state that the silica is in the form of a powder.

The Church et al reference teaches that when the liquid chromium composition contains additional oxides, they are in the form of particulate powders which are mixed into a slurry which is then applied to the substrate surface (col 29, line 67 through col 30, line 61).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to apply such a silica powder containing coating to the plasma sprayed coating of Schell et al in order to increase the durability of the zirconia layer, which, as shown above, Schell teaches is important to the zirconia layer.

When a reference discloses the limitations of a claim except for a property, and the Examiner cannot determine if the reference inherently possesses that property (in this case, that the heat treated silica would be amorphous), the burden is shifted to Applicant(s). In re Fitzgerald, USPQ 594 and MPEP §2112 **(claim 72)**.

5. **Claims 77-78** are rejected under 35 U.S.C. 103(a) as being unpatentable over Schell et al (US 5952110) in view of Koizumi et al (EP1035231, as supplied by applicant) as previously applied to claim 56, further in view of Brown (US 6417477).

Koizumi does not teach if its electrospark alloying process uses an intermittently pulsed current to generate pulsing electric discharges

However, Brown is also directed towards electrospark alloying processes and it teaches that electrospark alloying uses short duration electrical discharges (arcs) to transfer material from the electrode. It further teaches that a variety of ways are known to create those electrical discharges, including using short duration electrical pulses to create matching pulsed electrical discharges (col 1, lines 20-40).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use an intermittent pulse current to create pulsing electrical discharges because electrospark alloying processes normally produced such pulsing electrical discharges and pulsing current was one way known to be suitable to create those rapid discharges **(claim 77)**.

6. Regarding **claim 78**, Koizumi teaches using currents between 1 and 5 ampere [0050], which reads upon applicant's claimed range. Likewise Brown teaches using

very low currents which read upon applicant's claimed range to perform the process (4 amp, col 7, lines 50-60).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use currents such as between 1 and 5 amperes in the process of Schell in view of Koizumi in view of Brown because such currents were known to be effective for the process and would produce no more than predictable results.

Regarding the requirement that the average current be less than the peak current, since the current is pulsed (at some times having a current less than the peak current), the average current must be below the peak current.

7. **Claims 79-80** are rejected under 35 U.S.C. 103(a) as being unpatentable over Schell et al (US 5952110) in view of Koizumi et al (EP 1035231) in view of Kamo et al (US 4738227) in view of Church et al (US 3956531) as previously applied to claim 72, further in view of Brown (US 6417477).

Koizumi does not teach if its electrospark alloying process uses an intermittently pulsed current to generate pulsing electric discharges

However, Brown is also directed towards electrospark alloying processes and it teaches that electrospark alloying uses short duration electrical discharges (arcs) to transfer material from the electrode. It further teaches that a variety of ways are known to create those electrical discharges, including using short duration electrical pulses to create matching pulsed electrical discharges (col 1, lines 20-40).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use an intermittent pulse current to create pulsing electrical

discharges because electrospark alloying processes normally produced such pulsing electrical discharges and pulsing current was one way known to be suitable to create those rapid discharges **(claim 79)**.

8. Regarding **claim 80**, Koizumi teaches using currents between 1 and 5 ampere [0050], which reads upon applicant's claimed range. Likewise Brown teaches using very low currents which read upon applicant's claimed range to perform the process (4 amp, col 7, lines 50-60).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use currents such as between 1 and 5 amperes in the process of Schell in view of Koizumi in view of Brown because such currents were known to be effective for the process and would produce no more than predictable results.

Regarding the requirement that the average current be less than the peak current, since the current is pulsed (at some times having a current less than the peak current), the average current must be below the peak current.

Double Patenting

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either

anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. **Claims 56-58** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 26, 27, 30 and 31 of copending Application No. 10560360 in view of Schell et al (US 5952110).

In claim 26, '360 teaches forming a coating on a turbine engine by processing the portion of the turbine engine component by an dielectric spark machine with a tool electrode spaced from the component in an electrically insulating fluid. The deposited layer is a protective coating, specifically comprising SiC. The electrode is

formed from a powder (see claim 30) and the electrode is formed by compression (see claim 31). ‘360 teaches depositing the wear resistant layer on a blade tip face (see claim 28), but does not teach depositing a layer of an oxidation-resistant metal and a ceramic as that wear resistant layer. However, Schell et al is also directed towards the same application of coating turbine engine blade tip faces with wear resistant coatings, furthermore it teaches that it is common in the art to entrain the ceramic particles of the wear resistant layer in an oxidation resistant metallic matrix (col 1, lines 35-40) and done in order to cause the layer to be resistant to oxidation and corrosion (col 2, lines 54-66).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to include a oxidation resistant metal along with a ceramic wear resistant material in the electrode of ‘360 in order to deposit a known wear resistant composition for coating turbine tip faces which would also improve the corrosion and oxidation resistance of the coating **(claim 56)**.

Regarding **claim 57,** Schell teaches that the oxidation resistant metal can be NiCrCoAl and the wear resistance ceramic can be alumina (col 2, line 60 through col 3, line 6). Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use NiCr alloys and alumina as components to be deposited from the electrode, since they were known to be desirable coating materials for turbine engine blade tips.

Regarding **claim 58**, Schell et al further teaches depositing an additional ceramic layer **14** over the composite metal/ceramic layer (which can be considered

to comprise a protective metal coating portion **12** and a second ZrO_2-Y portion **16**, see figure 1) by a PVD process (col 5, lines 37-48), which further protects the substrate.

This is a <u>provisional</u> obviousness-type double patenting rejection.

11. **Claims 72 and 73** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 26, 27, 30 and 31 of copending Application No. 10560360 in view of Schell et al (US 5952110) as applied above, in view of Koizumi et al (EP 1035231) in view of Kamo et al (US 4738227) in view of Church et al (US 3956531)

As discussed above, from Schell, after an abrasion resistant layer is deposited, an additional ceramic material **14** is then deposited between the abrasive particles as part of this protective layer by plasma spraying (col 5, line 34-46). The ceramic is preferably made of a zirconia (col 4, lines 66-67) and it improves the durability and thermal stability of the underlying engine component (col 5, lines 6-12).

'360 in view of Schell et al does not teach depositing this second composite zirconia layer by an electric spark machine process. It also does not teach filling the pores in the zirconia coating with a SiO_2 powder and heating it to form amorphous SiO_2.

However, Koizumi et al is also directed towards a process for depositing wear resistant coatings. It teaches that electrospark alloying (ESA) methods are known to

be suitable for the deposition of such coatings. This method works by creating a spark between the substrate and a tool electrode formed of the material to be deposited, so that material from the electrode transfers to the substrate and forms a coating [0002]. This is done with a gas between to the substrate and the electrode (intermediate material) [0025].

Koizumi et al further teaches forming an electrode by mixing powders of the materials to be deposited. This should include at least one metal from a list which includes: Ni, Co, Cr and Al. The powder mixture is compressed and treated in order to form an axial body, which is the tool electrode [0010]. In addition to the metal powder, abrasive powders, such as cubic BN, is added to the powder mixture in order to increase its wear resistance [0023].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the first NiCr alloy coating of Schell et al by an ESA process as taught by Koizumi et al and then to deposit the first part of the second protective layer by mixing NiCr Alloy powder with alumina (metal oxide) or cubic BN powder and forming it into a tool electrode, and generating a spark between the electrode and the substrate so that the substrate is coated. The zirconia of the second protective layer could then be deposited by plasma spray. Such a person would have been motivated to deposit these metal containing layers by the ESA process since it was a deposition method known to be suitable for the formation of such protective and abrasive coatings which would produce predictable results.

Kamo et al is directed towards combustion engines (abstract) and contains teaching highly relevant to the insulating zirconia coatings on such components. Like Schell et al it teaches plasma spraying zirconia coatings on its engine components as a thermal barrier (col 5, lines 40-45). Kamo et al additionally teaches that, in order to further increase the durability of the zirconia, coating the zirconia layer with a ceramic coating material comprising silica which is impregnated into the pores of the plasma sprayed zirconia with a liquid chromium precursor and then thermally treated to 1000°F so that it closes the pores in the zirconia (col 5, lines 45-63). Since it does not say that the resulting silica is crystalline, so a person of ordinary skill in the art would expect that amorphous silica (glass) would be used. Furthermore after the heat treatment the resulting silica would be glassy (amorphous). Kamo et al incorporates the Church et al reference (US 3956531) in order to teach how the silica containing coating is used (col 5, lines 64-66), but Kamo et al itself does not specifically state that the silica is in the form of a powder.

The Church et al reference teaches that when the liquid chromium composition contains additional oxides, they are in the form of particulate powders which are mixed into a slurry which is then applied to the substrate surface (col 29, line 67 through col 30, line 61).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to apply such a silica powder containing coating to the plasma sprayed coating of Schell et al in order to increase the durability of the zirconia layer, which, as shown above, Schell teaches is important to the zirconia layer.

When a reference discloses the limitations of a claim except for a property, and the Examiner cannot determine if the reference inherently possesses that property (in this case, that the heat treated silica would be amorphous), the burden is shifted to Applicant(s). In re Fitzgerald, USPQ 594 and MPEP §2112 **(claim 72)**.

Regarding **claim 73,** as discussed previously '360 in view of Schell teaches using a NiCr metal alloy (e.g. NiCrCoAl) alloy (**claim 73**).

12. **Claims 77-78** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 26, 27, 30 and 31 of copending Application No. 10560360 in view of Schell et al (US 5952110) as applied to claim 56, further in view of Brown (US 6417477).

'360 does not teach if its electrospark alloying process uses an intermittently pulsed current to generate pulsing electric discharges

However, Brown is also directed towards electrospark alloying processes and it teaches that electrospark alloying uses short duration electrical discharges (arcs) to transfer material from the electrode. It further teaches that a variety of ways are known to create those electrical discharges, including using short duration electrical pulses to create matching pulsed electrical discharges (col 1, lines 20-40).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use an intermittent pulse current to create pulsing electrical discharges because electrospark alloying processes normally produced such pulsing electrical discharges and pulsing current was one way known to be suitable to create those rapid discharges **(claim 77)**.

13. Regarding **claim 78**, Brown teaches using very low currents which read upon applicant's claimed range to perform electrospark alloying processes (4 amp, col 7, lines 50-60).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use currents that are less than tens of amperes in the process (such as 4 amperes) in the process of Schell in view of Koizumi in view of Brown because such currents were known to be effective for such processes and would produce no more than predictable results.

Regarding the requirement that the average current be less than the peak current, since the current is pulsed (at some times having a current less than the peak current), the average current must be below the peak current

This is a <u>provisional</u> obviousness-type double patenting rejection.

14. **Claims 79-80** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 26, 27, 30 and 31 of copending Application No. 10560360 in view of Schell et al (US 5952110) as applied above, in view of Koizumi et al (EP 1035231) in view of Kamo et al (US 4738227) in view of Church et al (US 3956531) as applied to claim 72, further in view of Brown (US 6417477).

The same reasons applied to claims 77 and 78 apply to claim 79 and 80 here, but under the new references.

This is a <u>provisional</u> obviousness-type double patenting rejection.

Response to Amendment

15. The declarations filed under 37 CFR 1.132 filed 06-27-2011 are insufficient to overcome the rejections of claims 56-58, 72 and 73 based upon Koizumi as set forth in the last Office action because:

16. The Kawachi declaration argues that a Japanese family case of the Koizumi reference shows a figure that appears to be a normal hand welding device. From this applicant concludes that the Koizumi reference is related to arc welding. Applicant states that arc welding uses DC power to generate a continuous arc **(1)** at a current of several hundred amperes **(2)**. The implication is that the process of the Koizumi reference would then be an arc welding process using a continuous DC arc at several hundred amperes, which makes it not applicant's electric spark machine.

The teaching of Koizumi does not indicate that their process is a normal arc welding process. Particularly, in their example 5, Koizumi indicates using currents between 1 and 5 ampere [0050]. This is nowhere near where applicant suggests is required for arc welding **(2)**, so it must not be an arc welding process. What Koizumi indicates is that their process is an "electrospark alloying (ESA) technique" [0002]. The newly cited Brown reference teaches that ESA uses very short DC pulses **(1)** to create electric arcs which cause some material to be removed from the electrode and transferred to a substrate (col 1, lines 10-40). It teaches using very low currents to perform this process (4 amp, col 7, lines 50-60). As far as the examiner can determine, Koizumi's electrospark alloying device is the same as the device described in applicant's process.

17. The Ochiai declaration states that due to the information of the Kawachi declaration, the Koizumi device must be different than the one applicant has claimed. As was discussed for the Kawachi declaration, these arguments were unconvincing for the reasons supplied above. Ochiai further contends that a further distinction between Koizumi and their claimed device is that the electric spark machining device should not be controlled manually, but be controlled by servos. However, the claims do not require this, so it is not a distinction between the devices. The examiner would like to note that it is notoriously well known even to normal arc welding to use servo controls in order to improve the accuracy of the welding compared to manual arc welding. The examiner is quite certain that the same would be found for ESA techniques.

Response to Arguments

18. Applicant's arguments with respect to claims 56-58, 72, 73 and 77-80 have been considered but are not convincing in view of the new ground(s) of rejection necessitated by amendment.
19. The declarations have been considered above.
20. Regarding the arguments that Koizumi does not teach a pulse generator, so it is not an electric spark machine. As described in the rejection above, the use of electrical pulses to cause sparking is obvious. There is nothing to indicate that there must be electrical pulses for the process to be considered to be used an electric spark machine. As discussed by the Brown reference, such pulsing is a common feature

of ESA processes, which is why the examiner believes ESA processes to read upon the claimed process and device.

21. Regarding applicant's argument that their process operates at lower temperatures than Koizumi and in the previous response section that the importance of such lower temperatures is that heat affected zones are not created on the substrate surface, (1) the claims do not exclude using high heats or even the presence of a heat affected zone, nor is there a definition of an "electric spark machine" that excludes it either, (2) Koizumi found that though high temperatures are involved in their process, they teach that there is not enough heat in the process to even convert compounds in the electrode to their stable forms (e.g. diamond), so there will not be any significant (if any) heat affected zone on the substrate surface.

22. The examiner appreciates applicant's arguments and evidence, but the examiner does not see a distinction between what applicant is doing and what is known for electrospark alloying processes and machines. Furthermore, ESA is related to welding (there are similarities), but so is applicant's process.

Conclusion

23. No current claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL HORNING whose telephone number is (571)270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOEL G HORNING/
Examiner, Art Unit 1712

/David Turocy/
Primary Examiner, Art Unit 1717